Vol. IV. JUNE, 1898. No. 6.

The Forester

A monthly magazine, devoted to the care and use of forests and forest trees and related subjects . . . . . .

FOREST FIRES.

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THE AMERICAN FORESTRY ASSOCIATION.

ORGANIZED APRIL, 1882.

INCORPORATED JANUARY, 1897.

The object of this Association is to promote:

1. A more rational and conservative treatment of the forest resources of this continent.
2. The advancement of educational, legislative and other measures tending to promote this object.
3. The diffusion of knowledge regarding the conservation, management and renewal of forests, the methods of reforestation of waste lands, the proper utilization of forest products, the planting of trees for ornament, and cognate subjects of arboriculture.

Owners of timber and woodlands are particularly invited to join the Association, as well as are all persons who are in sympathy with the objects herein set forth.

OFFICERS OF THE ASSOCIATION:

Gen. FRANCIS H. APPLETON, Boston, Mass., President.
Sir H. G. JOLY DE LOTBINIÈRE, Quebec, Canada, First Vice President.
GEORGE P. WHITTLESEY, Washington, D. C., Recording Secretary and Treasurer.

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All communications should be addressed to

GEORGE P. WHITTLESEY,
Recording Secretary,
WASHINGTON D. C.

ANNUAL DUES . . . $ 2.00.
LIFE MEMBERSHIP . . 50.00.

Meetings of the American Forestry Association.

Two summer meetings are projected. The proposed meeting in California has been abandoned owing to unfavorable conditions. [See reference p. 95.]

At ***OMAHA, NEB.,*** in the first part of August, at the invitation of the officials in charge of the Trans-Mississippi and International Exposition;

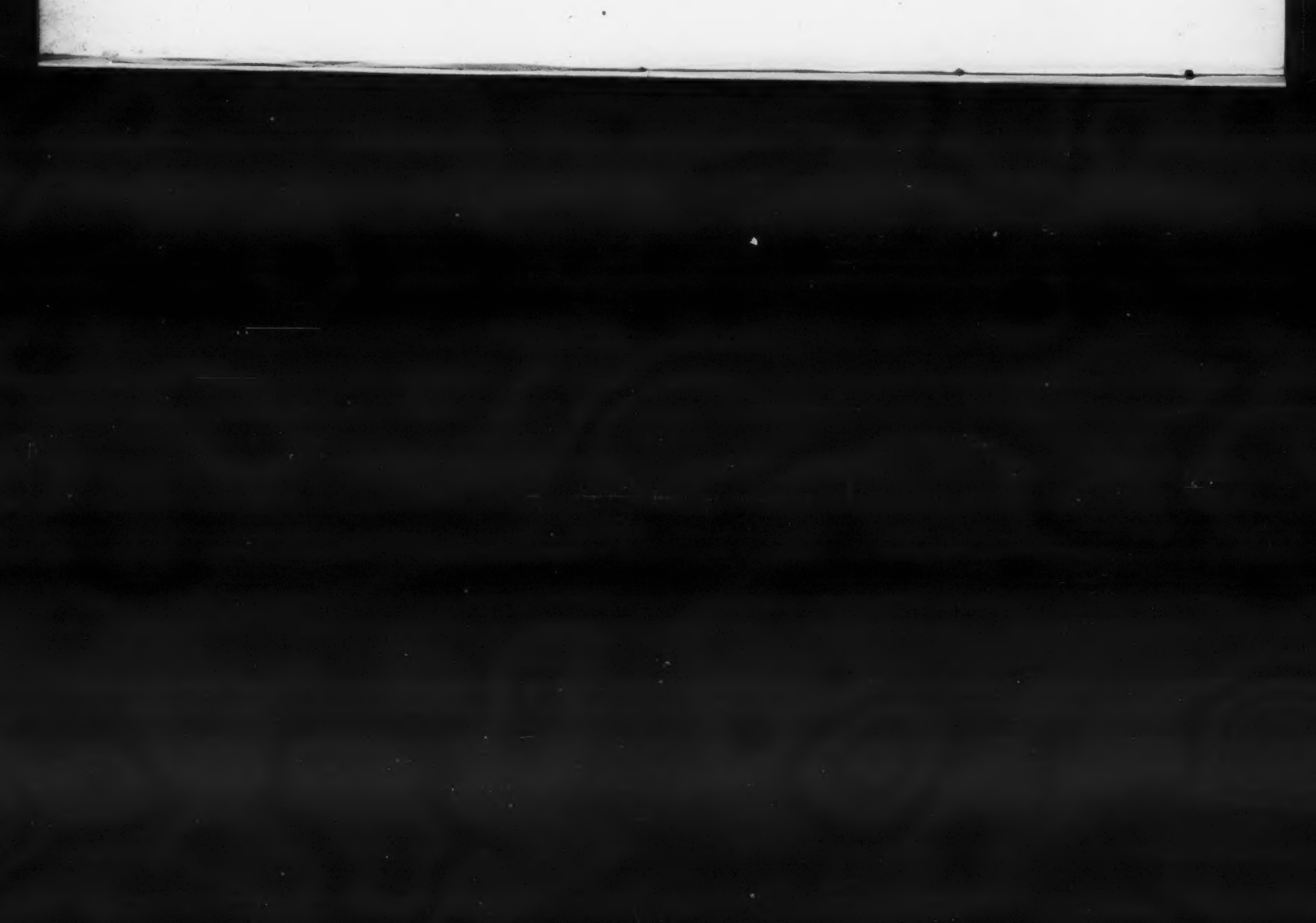
At ***BOSTON, MASS.,*** in the latter part of August, in connection with the semi-centennial meeting of the American Association for the Advancement of Science.

A local committee at each place is in charge with the following chairmen: Prof. F. W. Taylor, Lincoln, Neb.; Gen. Francis H. Appleton, Boston, Mass.

It is desirable to know beforehand how many may attend any one or all meetings, in order to make proper arrangements for reduction in transportation, hotel rates, excursions, etc.

ALL members who are likely to attend will please notify the undersigned of the fact.

GEORGE P WHITTLESEY,
Recording Secretary.



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PUBLISHER'S ANNOUNCEMENT.

THE FORESTER is published monthly by the American Forestry Association at

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THE FORESTER will be furnished free of charge to all active and honorary members of the Association. State Forestry Associations affiliated under Article III of the Constitution will receive the journal at club rates.

CONTENTS.

Note change in the meetings of the American Forestry Association.

Our National Disgrace.

While our arms are achieving or are to achieve national honor in battling for the principle of moral obligations on the part of a foreign government to its people, we are nearing the time of our own annually recurring national disgrace, in not recognizing our own moral obligation with regard to the treatment of the gifts of God, with which our country has been so abundantly blessed.

For it is a national disgrace, borne by a lack of moral concepts, that we allow each year an untold amount of useful material to be destroyed and an unsurveyed empire of our soil resources to be deteriorated by forest fires, thus injuring the future if not the present of our commonwealth.

This vandalistic condition and propensity is due to a lack of morality, individual, civic as well as general public morality; for if we had a proper conception of the wrong which the carelessness displayed in treating this public enemy, the forest fire, inflicts upon coming generations, we would put it down at once. Can it be done? There is a very general belief, an assertion often heard, that the forest fire is a natural phenomenon like the tornado and floods, which we are powerless to combat. Yet there is abundance of evidence that forest fires can be fought or checked with success and, what is better, can be prevented, or at least kept within limits, just as fires in cities, and thefts and murders are kept within bounds.

And if we gauge the civilization of a community correctly, according to the degree to which it is able to check or suppress crime and protect life and property, that community which is unable to extend this protection to all kinds of property, forest property included, must be

considered to that extent at a lower level.

In a recent report, we read that in 1896 "*very considerable damage by fire*" occurred in the Prussian State forests (some six million acres), and then the reporter brings a table showing that altogether less than 2,500 acres were burnt over. One "extensive" fire is reported as destroying 1,000 acres of "hopeful" Pine and Spruce plantation 20 to 25 years old, the result of incendiarism.

In the following year (1897) the entire loss was not over 100 acres. During the ten years, 1882 to 1891, there were 156 cases of fire reported; 96 from negligence, 53 from malice, 3 from lightning, and only 4 from locomotives; and seven years out of the ten are without any record of fire due to this last cause. And this on an area of 6,000,000 acres of which more than half is on dry sandy soil stocked with pure pine forest, where the pine litter is never burned or removed, and with large bodies of sapling timber and young growth interspersed.

Comment is unnecessary as to the possibility of protecting forest property from fire.

The Indian Forest Administration still more strongly refutes the assertion that forest fires may not be suppressed under circumstances not less difficult, nay, perhaps, more so than prevail in the United States.

Not only have the people of all timbered parts of India practiced the firing of woods for many centuries, both for purposes of agriculture and pasture, but the natural conditions in most of the Indian forests are such as to discourage the most sanguine.

In most parts the forest is a mixed growth of which a considerable portion is valueless, is left to die and litter the ground with dry and decaying timber, furnishing ready fuel. To this is added a mass of creeping and climbing vegetation, a dense undergrowth, largely composed of giant grasses, bamboos, covering the ground with standing or fallen canes, green and dry. It is a dangerous forest; and yet the Forest Department fights and prevents fires and *succeeds!*

The number of fires has been diminished to an astonishing degree; the efficiency has grown with perfection of methods, and the expenses have been constantly reduced and have never been over $10 per square mile in any year.

And this in a country where heat and moisture stimulate a rank growth, where a clearing will be covered in one year with grass in which an elephant can hide, and where hot dry winds make a most dangerous forest fire combination every year.

There is no insuperable difficulty in stopping the fire nuisance in this country, provided the moral obligation is recognized, the will is there, and the necessary organization is provided.

It has been tried by private efforts, and tried successfully in many isolated cases, and if the community wants it done it can be done everywhere. The attempts of the States of Maine, New Hampshire, New York, Pennsylvania, Wisconsin, Minnesota, are feeble enough, but they point to the true method and are successful in proportion to the effort.

It is useless to talk about timber culture and forestry in a country that has not yet attained the stage of civilization, when all property enjoys reasonable protection against destruction and damage by others.

Such scenes as the one on our cover, of which there are hundreds of square miles to be seen, especially in the Western country, are a standing warning to anybody against engaging in the business of forestry, which means accumulating interest on capital invested in a most hazardous form if incendiarism must continue to be tolerated.

News and Editorial Comment.

An order has been issued from the General Land Office of the Department of the Interior under date of April 29, 1898, prohibiting the grazing of sheep within certain closed areas about Crater Lake and Mount Hood, in the Cascade Forest Reserve of Oregon. The closed area about Mount Hood includes the whole of the Bull Run Reserve, and that portion of the Cascade Reserve north of the Barlow Road and west of the divide east of the East Fork of Hood River. The object of this closure is to protect the water supply of the city of Portland and the camping grounds and places of public resort about Mount Hood. The closed area about Crater Lake covers 249 square miles, located as follows: "Bounded north by the parallel forty-three degrees four minutes north latitude, south by forty-two degrees forty-eight minutes north latitude, east by the meridian one hundred and twenty-two degrees west longitude, and west by the meridian one hundred and twenty-two degrees sixteen minutes west longitude." The object of the Crater Lake closure is to preserve the forests and camp pasturage in the vicinity of Crater Lake, which, through its beauty and grandeur, is yearly attracting an increased number of visitors.

That the policy of Forest Reservations is appreciated in California, is evidenced by the fact that the Board of Trade of San Francisco resolved to ask for the formation of another forest reservation around Lassen Butte.

Lassen Butte is the source of many of the fine flowing streams which run from its base into the Sacramento, notably Battle Creek, Antelope Creek, Mill Creek, Deer Creek, and the North fork of the Feather River. There are a few private holdings within the region. The preservation of the forests at the foot of the butte is deemed a matter of the highest importance by the State Board of Trade, as serving the summer water supply of the creeks above named.

Representative Tongue, of Oregon, introduced a bill (H. R 7200) in January, which is now on the calendar, reserving the region around Crater Lake, to the extent of 249 square miles, as a public park. This is one of the most picturesque, as well as geologically most interesting regions in the United States, the lake, of emerald blue, filling the hole of an extinct crater of huge proportions, and being surrounded by a lovely forest of the Alpine Hemlock (*Tsuga pattonii*) and Alpine Fir (*Abies lasiocarpa*).

An attempt to secure this region for a national park, and prevent the vandalism which threatens it, was made at least five years ago, and ended in having the entire Cascade Range in Oregon set aside as a forest reservation, through the efforts of Mr. Bowers, then Assistant Commissioner of the Land Office.

If there were any appropriate management of the forest reserves, there would be no need of segregating the Crater Lake region as a park. That there is great need of doing something to protect this jewel of the Cascades may be learned from the fact that last summer we found the woods, not only around the lake, but even on the solitary island, a secondary crater cone, burning.

We learn, with satisfaction, that the United States Division of Forestry is not, as some newspapers feared or anticipated, "to be handed over to some politician."

Secretary Wilson is to be congratulated for having secured, as the successor of Mr. Fernow, a professional forester, Mr. Gifford Pinchot, who, a graduate of Yale University, obtained his forestry education in French and German schools and forests, and is well known to our readers as the inaugurator of Mr. Vanderbilt's forestry experiment at Biltmore. Forestry work has now reached a turning point, when professional effort will be called for more than hitherto, and Mr. Pinchot will have an excellent opportunity to advance it and make the Division what it should be, namely, an executive bureau in charge of the Federal timberlands and reservations.

Mr. Filibert Roth, who has been well known as the timber expert of the U. S. Division of Forestry, has been called as Assistant Professor to Cornell University and has been made an Instructor in the State College of Forestry and Forest Manager of the Demonstration Forest, the small appropriations necessitating the combination for the present of the two functions.

Mr. Roth will lecture on the branches of technological character, such as timber physics and wood technology, exploitation, and forest protection.

This transfer of Mr. Roth suggests that probably the valuable work in timber physics, which has given to the Forestry Division an international reputation, will also be transferred to Cornell University from the Department of Agriculture.

Dr. C. A. Schenck, whose departure for Europe we noted in our last issue, writes that he expects to return and open his projected forestry school at Biltmore, as announced in an earlier issue. The prospectus will be found on another page.

The New Jersey experiment stations have taken a step toward the establishment of a series of tests in forestry. Through the generosity of Mr. John C. Gifford a tract of land near May's Landing has been placed at the service of the stations for these experiments. Mr. Gifford is well known in this country as a forest expert, and he has shown his deep interest in his chosen subject as former editor of THE FORESTER. It is fortunate that he finds an opportunity open for spending the coming year in study in the forestry schools of Germany.

While the stations contemplate the planting and testing of various species of forest trees, the experiments can take definite shape and be pushed with vigor only so soon as means can be provided for the same.

It is, however, confidently expected that the importance of the work will be so self-evident that means will be forthcoming, and that it will not be many years before definite methods for the profitable growth of timber and forest products will be determined for the so-called "Pine Barrens" of New Jersey.

We have failed to mention earlier the proclamation of the Pine Mountain and Zaca Lake Forest Reserve, which bears the date March 2, and the signature of President McKinley, who thus has for the first time exercised the power conferred

by the well-known section 24 of the law of March 3, 1891.

This addition to the reservations in the southern part of California was made entirely at the request of the citizens of that region who are fully convinced of the value of such reservations in conserving and regulating their water supplies.

WAR ON THE FOREST RESERVATIONS.

Up to the time of this writing no decision has been arrived at regarding the continuance or discontinuance of the forest reservations except that the House has refused to agree to the Senate amendment annulling the reservations made by President Cleveland.

Meanwhile the newspaper press, in spite of the more exciting war news, continues to comment most persistently and forcibly on the propriety of upholding the reservations.

Even the Tacoma *Ledger*, which is the exponent of the opposition to the reserves, is weakening. It says:

"If the forestry reserve order is not abolished it might better be enforced now than a year from now, for it will save those interested from wasting another year's time and labor."

It ends a long harangue on the rights of the poor settler, which are violated by the withdrawal of these mountain forests from settlement by the following kindly comment on the efforts of the Association, exhibiting the *Ledger's* ignorance of its membership and objects:

"Congress would do better to keep the hands of the Forestry Association off the settlement and development of the State of Washington. This is entirely a question of the sentimental efforts of an association of scientists, which might prove beneficial in the Eastern States where the timber has been largely denuded, but which is about as practical in this country as carrying coal to Newcastle, and the struggle of honest settlers and investors to save their homes and the labor of years and of the people of this great State to prevent millions of acres of agricultural and mineral lands from being withdrawn from settlement and development."

In curious contradiction to these attempts to defend the interests of the settler and to save him from forest preservation there comes a letter from the secretary of the Settlers' League of the State of Washington, which reads as follows:

"Will you permit us to enter a solemn protest against the destruction of timber in our State.

"The Northern Pacific Railroad Co. claims every odd-numbered section of land of a strip from the Columbia River to Tacoma and one hundred and ten miles wide, the most dense and valuable piece of timber land in the United States.

"To say nothing of other abuses in connection with this land, we most respectfully call your attention to the manner in which millions of feet of the most valuable timber is lost every year. The railroad company sells the timber to loggers for so much per M.; the logger cuts the best and handiest and leaves the rest; the dead tops become dry and burn readily; there is no effort at protecting and therefore the great waste.

"It not only burns millions of feet annually, but it is also destructive to other property, burning bridges, puncheon or corduroy roads, fences, etc. It is also destructive to game, the loss of which is much felt by the many settlers who are far removed from town or city.

"Any suggestion from you offering any protection or relief will be most thankfully received."

The Boston *Transcript*, with more vigor and righteous indignation than truth, says:

"A more gigantic piece of rascality has not been undertaken in this country in years than this attempt of the wealthy lumber corporations of the Northwest to secure the setting aside of the thirteen forest reservations."

We do not think that the great lumber operators have taken much interest in this war against reservations, partly because the timber withdrawn is largely for the present inaccessible or commercially worthless, partly because they know well enough that at the proper time they will be able to secure it under fair conditions. It is rather more sheep and mining interests and blatherskites who take a pleasure in howling at the Government who have kept up the fight.

Probably the *Tribune* of Sioux City gives the most plausible explanation of the Senatorial indignation when it says:

"Now, as a matter of fact, those who are responsible for the introduction of the amendment are guided solely by their dislike for Grover Cleveland. With them it is one way of securing revenge or 'getting even' for the attitude of contempt shown for their vagaries by the late President, and is simply one of many instances of their inability to rise above vindictiveness when the welfare of the country demands that personal feelings be disregarded. It is true that Pettigrew and others do not proclaim this as their motive, but the reasons they do give are so absurd that the controlling motive stands out as prominently as ever. The seekers for a species of 'revenge' that would not harm Cleveland at all, but would be of great injury to the Mississippi valley, may be able to convince a few colleagues that the forest reserve order is causing great suffering among settlers, and the votes of these, together with what 'Senatorial courtesy' can muster, will probably pass the amendment in the Senate. The protest that is made in a majority of the prominent newspapers of the Northwest should have its influence with the House and lead to the prompt defeat of the amendment.

"On account of the immense individual and national interests at stake it can be conceded that a few hundred settlers have suffered by the forest reserve order and the latter permitted to remain in full force notwithstanding. It would be folly to endanger our agricultural interests and put millions upon millions of dollars' worth of property in jeopardy in order to protect a handful of persons from the loss of a few hundred dollars. The forest reserve order should stand and be supplemented by more legislation of the same sort."

The *Evening Post* makes a significant comment on the attitude of these Western representatives who prefer the reckless abuse to which our public timber domain has been subjected to a more conservative policy by quoting from Mr. George P. Marsh's admirable volume, "Nature as Modified by Man," who cites a certain authority as saying that the deterioration of Spain from its position as a first-class power was largely due to the reckless destruction of its forests, and says:

"I believe Spain is the only European land which has not made some public provision for the protection and restoration of the woods—the only country whose people systematically war upon the garden of God.

It is over forty years since Marsh in this volume warned us that we were rapidly approaching the time when the fate of Mediterranean countries would be ours. Would it not be a strange, sad comedy if Congress should at this time vote to return to the antiquated Spanish policy from which the Forest Commission bade fair to rescue us?"

We are sure these same Western advo-

cates of vandalism would hardly have come up to the expectations of the sentimental (?) historian Josephus, who, writing of the siege and destruction by Titus, thought even in those "uncivilized" times of the esthetic aspect of forest destruction. We quote this interesting passage from his history of the Jewish war (book vi, chap. 1):

"Although the Romans had great work with the structure which they had undertaken and with the procurement of the timbers, yet the bulwark was completed in twenty-one days, but all woods and forests for eleven miles around the city were felled, hence the great desolation and lack of beauty of the Jewish country which before was blooming with green woods and beautiful pleasure parks. After the trees were cut down everywhere it looked like a desert and was so desolated that no stranger who had formerly seen the magnificent country and fine suburbs and now contemplates the desolation (hungry condition) can repress the tears and sobs over the change, and if anybody who knew the country well before should have come there unawares he would surely not have recognized the place, but would have had to ask for the city."

The New York *Tribune*, in a vigorous editorial, having evidently in mind such experiences as the one just cited, says:

"Those who learn from their own mistakes to repair past losses and avoid further misfortunes are wise. Those who profit by the experience of others before disaster befalls themselves are wiser yet. If the people of the United States do not soon adopt adequate measures to stop the devastation which has already passed the limit of safety they will ultimately be compelled to follow the example of older nations and resort to the slow and costly process of reforestation. * * * It is clear that no legitimate interest could suffer by the adoption of that course, while it would save the country from the discredit and misfortune of reversing an enlightened action deliberately taken. * * * It will be deplorable if Congress now abandons the tentative course which contains the promise of a wise and permanent National policy."

We certainly agree with the New York *Sun* of May 10:

"That the amendment to the Sundry Civil bill abolishing the forest reservations, which has passed the Senate, ought not to be adopted is the judgment of nearly the entire press of the United States and of every intelligent person who is not influenced by some selfish motive."

"One of the very best things that Mr. Cleveland ever did was to set apart great areas of forest land as a National reserve, and to warn the timber thieves off the National domain.

"Unhappily this good work is threatened with undoing. The Senate has already passed an amendment to the Sundry Civil bill wiping out all the reservations.

"The matter is now with the House. There ought to be intelligence and patriotism enough there to defeat it, but is there?

"The timber thieves are strong and eager to pay for favors."—*New York World.*

"The association urges that the Senate amendment suspending the reservations be one year, pending survey. This request seems to be based on a perfect understanding of the necessities of the case, as the policy of forest reservations has been generally approved by the people."—*Buffalo Evening News.*

"As the American Forestry Association is engaged in an unselfish mission, its recommendations are entitled to careful and impartial consideration. The question under discussion should be decided solely upon its merits, and not on partisan or personal grounds."—*Baltimore Herald.*

"This action of the Association is

timely and patriotic. In times of war the timber plunderers will find their safest opportunities for despoiling the public domain; they are intent on picking Uncle Sam's pocket while his back is turned."—*Forest and Stream.*

"It will be a severe blow to many thousands of honest homesteaders if Congress passes the Senate amendment, abolishing the National reservations, and leaves the forestry at the mercy of timber thieves."—*Chicago Times-Herald.*

"If there are any wrongs inflicted by the Cleveland forest reservation order of February, 1897, redress has been fully provided for in the act of June 14 of the same year, giving the President power to suspend, reduce or abolish the forest reservations. The interests involved can lay their grievances before President McKinley, and if there is anything wrong in the Cleveland order, Mr. McKinley will right it. He is a steadfast friend of American industries, and the timber interests of the Northwest would get justice at his hands. The Senate amendment to the Sundry Civil bill should be stricken out."—*Milwaukee Evening Wisconsin.*

"The motives of opposition to the forest reserve policy are somewhat hard to analyze. They resemble somewhat the antagonism to Civil Service reform, in that a few incidental mistakes and inevitable annoyances are hastily taken as sufficient condemnation of the whole thing. It is impossible to inaugurate a system of reform of any kind without intrenching upon somebody's private rights, and that somebody usually makes such a disturbance that the larger good of the greater number is overlooked and forgotten."—*Buffalo Commercial.*

"There is good reason to suspect that the opposition arises in reality from persons who have been destroying the timber and robbing the Government."—*Baltimore News.*

"The friends of scientific forestry have always claimed to be the best friends of the lumbermen also. Their friendship, however, has included the lumbermen of 1998 as well as the lumbermen of 1898. This breadth has not been heretofore as highly appreciated by the latter as it should have been; but his own observations and experience are beginning to teach him that no narrower measure of friendship has been or is compatible with entire sincerity."—*St. Paul Pioneer Press.*

"The lands thus set aside are desired by greedy land companies, not for settlement, but for speculative purposes. With exasperating shortsightedness, the Senators are ready to undo all the good work that has been done and tolerate the destruction of forests too valuable to lose.

"It is in these sections that the headquarters of the Missouri River system are to be found, and every stick of timber that is cut away will contribute a little more to the fury of the floods that annually devastate thousands of square miles of lands. Forest destruction under such circumstances is not merely reckless; it is absolutely criminal."—*Yonkers Statesman.*

"Midst the crash of resounding arms it is hoped the Government at Washington will not overlook the pestiferous scheme that has recently taken shape looking to the annulment of the forest reservations established early in 1897. This scheme had its origin in the greed of a lot of mine and sheep owners, who are as careless of the future and of the rights of coming generations as the beasts of the field. Representatives in Congress should look to it that this nefarious scheme of annulment of the forest reservations is indefinitely postponed."—*Cincinnati Times-Star.*

"Whereas, by the operation of a common sense policy on the part of the Government, a fine income could be obtained from the timber sold, and yet enough trees be left to protect the land and the sources of the water supply of thousands of miles of territory in all directions."—*Brooklyn Citizen.*

"There can, we think, be no doubt of the desirability of the Forestry Association's suggestion being adopted. The course of action outlined in the Senate amendment is open to grave objection. It would, in effect, do away with the results which have already been obtained under the guidance of acknowledged experts on the forestry question, and, in fact, it represents the intrusion by Congress into a domain in which its only valuable function could be that of ratifying the action of persons specially informed. Congress should keep its hands off the forests."—*Bradstreets.*

"It is evident that, so far as the legitimate objects and operations of mining are concerned, no distinction is now made by the law between forest reservations and other parts of the public domain; but miners within such tracts are obliged to observe the regulations established by the Government to prevent the reckless destruction and waste of the public timber resources. I understand that there is no objection to this obligation on the part of bona fide miners. Those who propose to mine with sawmills doubtless feel themselves aggrieved."—*Engineering and Mining Journal.*

New York State College of Forestry.

The preliminary announcement of the courses in the new State College of Forestry at Cornell University has just been published in the Spring Register of the University. It will interest our readers to see the scope of the four-year course leading to the degree of Bachelor in the Science of Forestry. Besides the courses in fundamental and supplementary branches, namely, in mathematics, physics, chemistry, zoology, botany, geology, engineering, political economy and law, there are twelve forestry courses announced, as follows:

COURSES IN FORESTRY.

1. Synoptical Course in Forestry. Economic Nature and Political Aspects. Designed especially for students of Political Economy, Agriculture, Engineering, and freshmen in the College of Forestry, to acquaint the student in a brief manner with the several subjects comprising the field of forestry. Two hours, winter term.

2. One-year Course in Forestry, with special reference to Silviculture. Designed especially for agriculturists and others who desire a brief study of the technicalities of woodcraft and silviculture. Three hours, through the year.

3. Silviculture. Principles of arboriculture, application of dendrology to crop production, methods of reproduction, improvement of the crop, nursery practice and forest planting. Three hours, through the year.

4. Forest Protection. Methods of guarding against trespass, loss from fires, insects and disease; measures to prevent erosion, washing and deterioration of soils. Three hours, spring term.

5. Timber Physics and Wood Technology. Technical properties of wood and its uses. The course is arranged to meet also the needs of students in Civil Engineering, Architecture and others interested in the properties and uses of wood. Three hours, fall and winter.

6. Exploitation. Methods and means employed in the harvest of forest products, logging, transportation, milling and preparation of wood for market. Three hours, winter term. Excursions to actual operations and points of manufacture.

7. Forest Mensuration. Methods of ascertaining volume of felled and standing trees, of whole forest growths, timber estimating, determining accretion of trees and stands. Three hours, winter and spring.

8. Forest Regulation. Principles and methods underlying the preparation of plans of management for continuous wood and revenue production. Four hours, fall term. Field work in summer.

9. Forest Administration. Organizing a forestry service, manner of employing and supervising labor, business methods as applied to forest management. Two hours, spring term.

10. Forest Valuation. Principles and methods of ascertaining the money value of forest growths at different ages for purposes of sales, exchanges, damage suits, etc. Two hours, spring term.

11. Forestry Statics and Finance. Application of the principles of finance to forest management; methods of finding the most profitable form of management, determining rotation and expenditures with reference to revenue. Three hours, winter term.

12. Forestry History and Politics. Historical development of the economic and technical features of modern forestry; forestry conditions at home and abroad; forests and forestry as factors in the household of the community and nation; basis and principles underlying forest policies of the State. The course will prove of value and interest to students of political economy. Two hours, winter and spring.

The fundamental and supplementary branches with over 1,400 hours are mainly confined to the first two years, while the forestry courses with 880 hours are principally to be taken in the last two years. For those who do not want to take the full course provision is made to enter as special students, but from the requirements for entrance to the regular course it would appear that only thoroughly prepared students will be able to take the full course successfully.

The complete forester is a manager of a business of technical character. Hence a competent forester requires at least three kinds of knowledge, namely, scientific knowledge of the natural sciences, technical knowledge of the methods of applying the former toward the production of forest crops (silviculture), and, finally, practical knowledge of business, engineering and finance, which will enable him to manage an estate and turn the results of silviculture to account in the production of revenue. In addition, merely as an educated man of a higher order, he should possess a general knowledge of the relation of his business or art to the rest of the world, and hence a knowledge of political economy and of the basis and application of a forest policy in a comprehensive system of the national household would be desirable. All this it is expected the student will find in the College of Forestry.

The greatest interest of the public at large will undoubtedly attach to the demonstration which is to be made in the Adirondacks in connection with the College. As the land is not yet secured it is possible at present only to point out the conditions and objects of such a demonstration.

When the Constitutional Convention of 1894 decided to forbid all cutting and selling of timber on the Adirondack State reserve, it seemed the greatest setback to the forestry movement in the United States, for forestry means the cutting of trees, not allowing them to rot uselessly. Briefly defined, forestry is the rational use of forest growth, which can only be done by removing it, not like the lumberman, but judiciously, with due regard to the future, to reproduction. With the present law, which provides for a demonstration on a small yet sufficiently extensive scale, of the manner in which forestry may be practiced, a step has been taken which reconciles us to the action of the Constitutional Convention. It was fear that the management of the reserve without any precedents as to proper procedure might miscarry, which no doubt prompted the preference of the convention for leaving the reserve for a time at least in its natural condition. The proposed demonstration should teach how, mainly by the proper use of the axe, not only all the useful timber can be harvested and used, but a new and superior aftergrowth be secured without in any way impairing the functions of the forest growth in protecting soil and regulating waterflow, and that this can be done as a business proposition and profitably.

Whether such a demonstration can be successfully made must, to be sure, depend largely on the manner in which it is begun and carried out. The reference of the matter to Cornell University insures at least one essential factor of suc-

cess, namely, exclusion of unstable, political conditions in the management.

We would, however, point out that to assure full success which, we take it, is expected from the financial as well as the silvicultural point of view, even the selection of the ground on which the experiment is to be carried on, is of the greatest importance.

Silvicultural success can be forced anywhere; it is only a question of expense. Even on the bare rocks the French have shown in their reboisement work that forest growth may be started by carrying soil in baskets to the trenches hewn into the rock

If the forester had nobody to control his purse strings he could, provided he possess the necessary silvicultural knowledge, reproduce his crop without difficulty. There is nothing in particular to learn or to prove that is not yet known to the technically educated forester of experience in planting or reproducing wood crops in such conditions as are found in the Adirondacks. If, however, he works under the usual limitations which financial considerations impose, nay, if he is expected not only to make silvicultural demonstrations of planting, reproducing and improving wood crops, but to produce a money result, a profit, he must be a manager as well as a forester, and he must be placed under conditions under which his business *can* be made profitable.

Any one conversant with the economic conditions surrounding our wood trade and with the silvicultural aspects and requirements of forestry will have to agree that financial success, at least immediate, will not be easily secured unless the property to be subjected to the experiment be chosen with the greatest circumspection. Its size not only and its contents, but its location as well, will have to be considered.

To be sure profits, in the sense in which private enterprise looks at them, can not properly be the sole or even the main object of any experiment. Nevertheless it would be expected, and with propriety, that such an experiment, which is to demonstrate that forestry as a business may finally be extended to the whole Adirondack reserve, should soon at least support itself. To do so the property must contain some salable material; it must be located with reference to markets so that the products can be transported to it cheaply enough to leave a margin.

Since the experiment is to serve ostensibly as a demonstration of how to manage the Adirondack reserve the property should fairly represent the various conditions met in the Adirondacks. There should be enough virgin forest not only to furnish salable material to help pay for the development of the property, but to show how to begin operations in the virgin forest. Few people realize that forestry is best begun when the axe is laid on the first tree and not when the lumberman has mismanaged the woods. When the house is once dilapidated you can not expect much revenue from it; you must repair and rebuild, which costs.

Then there should be cut-over lands that are simply culled of their Spruce, the most valuable of the Adirondack species, but otherwise uninjured, to show how the Spruce may be re-established while harvesting the hard woods. There should be also burnt-over lands in varying degrees of deterioration to demonstrate the methods of recovery, although probably such land may be had in the State Forest Reserve, and no objection may be raised to improving the same by planting.

There is no doubt that a suitable tract may be found representing all or most of the desirable features, but there is also no doubt that with the present appropriations nothing but preliminary work can be undertaken, namely, becoming acquainted with the property, taking stock and elaborating working plans. To manage such a property, just as is necessary in any other business, adequate working capital is required, and in proportion, within reasonable limits, to the outlay will be the return. This is interestingly illustrated in the forest ad-

ministrations of Europe, where invariably increased expenditure per acre has been followed by increased gross and net income. Prussia, with six million acres of forest property, spends $1.38 per acre on its management and gets $1.27 net in return. When it spent only $0.98 per acre the revenue was $0.96. Bavaria, spending $1.78 per acre on about two million acres situated very nearly as inaccessibly as our Adirondack woods, nets 1.93 per acre, while Saxony, with an expenditure of $2.20 per acre, manages to net $4.50 per acre annual revenue.

We shall, to be sure, not expect any such expenditures to be made or returns to accrue, especially in an experiment, since experiments are proverbially expensive. There is, however, no reason why, with a properly selected tract and an adequate expenditure for the first few years, a revenue of 2 or 3 per cent on the investment should not soon return to the State from the management.

The principles that underlie such a management may be briefly formulated as follows:

The ground is to be kept perpetually in forest and permanently devoted to wood cropping.

The old forest crop is to be so cut that a reproduction of superior character shall take its place. This silvicultural requirement necessitates the cutting in the same locality for several years in succession according to the success of the reproduction. It can not be done, as the lumberman does it, who removes all at once the merchantable timber and leaves the reproduction to nature and accident. (Of course planting will have to be resorted to where the property is already mismanaged or where other reasons make it desirable.)

This silvicultural requirement as well as other economic and administrative reasons necessitate that all parts of the property be kept accessible all the time. Hence a system of permanent roads supplemented by temporary roads, movable tramways and waterways is the first requisite, like the stairs in a house that are to serve their purpose.

The forest crop matures in 60 to 100 years—the Spruce in the Adirondacks may properly most profitably be managed in a rotation of that length. It is desirable for evident business reasons to so distribute the harvest, that a proportionate part becomes available every year, distributing the revenue from the property as much as possible into equal amounts, instead of larger but intermittent returns.

The normal, ideal forest would be one that produces from every acre annually the same income, or, if the growth per acre were like all acres and we had 100 acres, on which the species forming the forest makes the most profitable crop in 100 years — a 100-year rotation — we should cut one acre every year and when the hundredth acre had been cut the first one would again be ready for the axe.

It is to approach such an ideal that the forest manager sets out, although in practice many considerations vary the method and the final result. But in all methods permanency of working plan and persistency in following it with only such slight modifications as experience and results dictate, are essential for success.

To bring a mismanaged property, as most of our woodlands are, into or near such condition takes not only expenditure in the beginning—curtailment of present revenue to insure a continued revenue—but time. Many of the German forest administrations, although over 100 years in existence, have not yet reached the normal condition in all parts of their property, and their seemingly low percentage returns are due to the fact that they are still spending money to put the property in full working order.

To use a homely comparison: we may have the four walls of a hotel and even a roof over them, but until we have put in the floors and the windows, the stairs and the furniture, and organize the interior, we may, to be sure, use it occasionally for storing purposes, but we can

not rent rooms and derive a continuous adequate revenue from the property.

In a "school forest" considerations of its educational and experimental nature preclude to some extent the strict observance of principles of close financial management. It will be necessary in order to illustrate the different methods employed to secure reproduction to devote at least small portions to such illustration even if a particular method is not the most commendable in the given case. It will be desirable to show "how not to do," as well as "how to do," by exhibiting the failures as well as the success of certain methods.

It should be understood that such considerations will necessarily affect the financial result of the management unfavorably. In the end only the elements of profitable management can be established by experiment, not profitableness itself; for experiment always costs.

Fixing up a Woodlot in Massachusetts. Trimming White Pine.

In January, 1891, having in view the cultivation of White Pine, a tract of 50 acres of woodland was purchased for $400, situated two and a half miles from the central post office in Plymouth, Mass. The tract is a succession of hills and hollows, holding its own rainfall with the exception of a few acres at one corner which drains beyond the bounds of the lot. The soil is light, the subsoil, so far as known, sandy and gravelly. It is bounded on one side, for half a mile, by a highway. Two wood roads cross the land diagonally, and other roads have been made for convenience and to give better protection against any fires that may occur.

This lot has been cut over many times; the previous owner cutting almost yearly for many years, wherever it would yield the best fire wood. I found the lot largely covered with a mixed growth of White Pine and Sprout-oak of all ages up to fifty years; the oaks usually the most abundant, but there were some tracts of a few acres each, six to eight acres in all, of Pines of 25 to 50 years growth, with few Oaks among them.

Every winter I have cut upon some part of the lot and finished the cutting in the winter of 1896–1897.

The plan pursued has been to remove all the Oak that interfered with or shaded too much the growing Pine, and yet leave enough trees standing to encourage the sprouting of Pine seed with which the ground in many places was well supplied, and also to leave some shade to the young seedlings for a few years.

Since 1890, enough Pines have come up in many places where Oaks formerly predominated to give promise of a thick Pine forest in years to come, and whereever this new growth of Pines is four years old, the Oak sprouts have been broken off. Our pines, five years old and over, seem to thrive best in places where all other trees have been removed. It is a question whether the oak sprouts, huckleberry, and other low growths would not have made enough shade for seeds to germinate and grow to the best advantage if all the Oaks had been removed.

While cutting the surplus wood, it was our custom to cut off all the dead branches of the standing Pines as high as could be reached from the ground, with an axe, and occasionally to cut live limbs to the same height. The method for the first four years was to cut the limbs as near to the trunk as could be done without injury to the bark of the trunk, but sometimes accidentally the cut would extend into the wood of the trunk, and in smoothing the wound, some bark of the trunk would be removed all around the cut. In a few years time it was found that the scars made by limbs thus cut off had become partly or wholly covered with new bark, while the scars made by cutting off limbs without cutting into the bark of the trunk had not healed over and showed little or no signs of doing so.

The most of the trimming of the last two or three years has been done on the plan of cutting into the trunk enough to

make a scar from two to three times the diameter of the limb cut off, cutting enough on all sides of the limb to be sure to cut through the bark of the trunk, for if the bark on any part is left unbroken it will not close in upon that side, and longer time will be needed to cover the wound with new bark.

Live limbs of all sizes, up to three inches in diameter, and some even larger ones, have been cut off in this way and give promise of becoming entirely covered with new bark. All trees five feet high and over have had one or more rows of the lower limbs cut off, the plan being to continue such trimming yearly until all limbs have been removed to the height of twenty feet.

The difference in these two methods of trimming is well shown on one small tree. Four years ago several limbs, one-fourth to three-eighths of an inch in diameter, were cut off with a knife as close to the tree as could be done without cutting into the bark of the trunk or into the enlargement that often forms where the limb joins the trunk. Two years ago, several other small limbs were removed from the same tree, but instead of being careful to cut off only the limbs, special care was taken to cut into the bark of the trunk, leaving scars two to three times the diameter of the limbs cut off. New bark has closed over the limbs thus cut off two years ago. Where the limbs were so carefully cut four years ago bark has not covered the wounds, but the tree has grown outward all around the wounds, leaving holes in the trunk about three-eighths of an inch deep. Cutting into the bark of the trunk causes some loss of sap the first year, but the upward growth of the trees thus trimmed appears to be as rapid as of trees trimmed otherwise or not trimmed at all.

The greatest upward growths of the last seven years are found on trees trimmed in this way; whether it is due to difference in the seasons or to the trimming we cannot say. We have trimmed trees at all seasons of the year, but consider the middle to the end of summer to be the best.

A drawing knife is convenient for trimming small low limbs and for smoothing limbs cut with a saw. Some sizes of limbs are best cut with a thin sharp axe, skillfully used, striking the limb neither up nor down, but with side cuts.

So little labor is required to properly cut off small live limbs that it seems to be an economy in thick growths of pine to cut off the limbs that would soon die if not removed, and thus secure clear lumber for all subsequent growth, instead of leaving the limbs to die and hold to the trunk many years afterward, thus causing an inferior quality of lumber. It requires more time to properly trim dead limbs than live ones.

In early spring of 1891, and every winter since, the circumferences of 38 White Pine trees were measured to ascertain the annual growth. The trees (in 1891) were of ages from 26 to 50 years; the average age was 36. Tack nails were driven into the trunks about five feet from the ground to insure measuring at the same place each year.

The measurements show that the average gain in circumference of the 38 trees was as follows:

1891.	1892.	1893	1894.	1895.	1896.	1897.
$\frac{68}{100}$	$\frac{91}{100}$	$\frac{125}{100}$	$\frac{119}{100}$	$\frac{103}{100}$	$\frac{111}{100}$	$\frac{117}{100}$
inch.	inch.	inch.	inch.	inch.	inch.	inch.

Percentage of gain, taking 1891 as 100:

100.	135.	184.	176.	152.	163.	172.

Probably the gain over 1891 should be reduced to 20 per cent. The annual growth in height of White Pine trees varies much with the season. From an examination of many trees, and trees on other woodlands, it appears that the upward growth of White Pine was above the average of the last twelve years in 1890, 1894, 1896 and 1897, and was below the average in 1891 and 1895.

The average growth of the 38 trees in seven years was seven and one-third inches in circumference, or two and one-third inches in diameter.

The largest circumference growths of single trees in the seven years were 11¾, 11½, 11¼, 9½ and 9¼ inches,

of respective ages, 30, 42, 30, 26, 33 years, in 1891.

All these five trees were standing in places where the slope of the surface of the ground was favorable for carrying surface drainage to the roots, and were but little shaded by other trees.

The smallest growth made in seven years by single trees were 3, 3, 3¾, 4¼, 4½ inches, of respective ages, 35, 45, 49, 35, 35 years, in 1891.

All were standing on slopes tending to carry surface water away from the roots, and were more shaded than the five trees showing the greatest growth.

The rapid increase in growth after the first year may be mostly due to the removal of the Oak trees, giving more air and more light and warmth from the sun, and leaving less foliage to consume the moisture of the ground.

There has been a wonderful transformation in the appearance of the tract in the seven years of work at a total expense of less than $4 per acre.

The best way found to kill Oak stumps is to pound off the sprouts in winter when the stumps are frozen. Where trees had been cut four years, very few stumps treated in this way sprouted again.

As the work could not be best done by contract, it was paid for by the hour. The cutting, drawing together the scattering wood and cording it cost what the wood sold for, namely, two to two and a quarter dollars per cord on the lot.

The cost of removing stumps in new roads and moving the bushes every year until killed has been $50.

Cost of trimming to this time has been $40.

Sprouts have been broken off from as much as half the lot, which with the limbs from the Oaks and trimmings of the Pine have been burned, and the ashes scattered around at a cost of $100.

As the different kinds of work have sometimes been carried on together, the cost of each is only approximately correct.

NATHANIEL MORTON.

Forest Conditions of Wisconsin.

The State of Wisconsin is the first to have undertaken officially a systematic inquiry into its forest wealth. To assist the newly created Forest Commission, the Geological and Natural History Survey of the State, at the suggestion and with the co-operation of the U. S. Division of Forestry, devoted five hundred dollars to this purpose. The work was performed by Mr. Filibert Roth, one of the experts of the Division of Forestry, and a full report of the same has been published both by the Geological and History Survey of Wisconsin, and by the Department of Agriculture as Bulletin 16 of the Division of Forestry.

This Bulletin contains also an exposition by Dr. Fernow, the Chief of the Division, of the nature and object of such surveys in general, as well as the manner of procedure and of the character and relative accuracy of the information obtained.

The survey was necessarily in form of a canvass, relying more on the knowledge of the numerous local woodmen than on personal examination, this latter, for want of time, having been restricted to the inspection of typical cases.

During a journey of three and one-half months, 27 counties, with an area of over 18 million acres, or little over half of the State, were visited, no county receiving less than two days' attention.

From the information thus obtained, it appears that this northern half of Wisconsin is an undulating plain, with less than 5 per cent of real hilly land, but nearly 20 per cent of low, flat ground; that nearly 30 per cent, in four distinct areas, is made up of loamy sand lands, the remainder being gray loam and clay lands, while nearly 12 per cent of the total is occupied by swamps. From the farmer's standpoint about 60 per cent is fit and 37 per cent unfit for agriculture, and should therefore be kept in forest. The climate of the entire region is cold; corn is grown successfully only in the southern and the dryer western portions; the Hickories are practi-

cally wanting as forest trees, and even the timber oaks are, over the greater part of the area, represented only by thinly scattered Red Oak.

Formerly this entire area was a continuous forest, fading out at the southern and southwestern portion into Jack Pine and Oak openings, or brush prairies. On the sandy areas the forest was real pinery, without merchantable hardwoods; on the remainder it was a mixed forest of hardwoods and conifers, with scattering smaller tracts resembling pinery and, in fewer cases, pure bodies of hardwoods. Hemlock with Birch formed the conspicuous companions of White Pine on the loam lands of the eastern half, but the former was wanting and the latter largely displaced by Oak in the western, especially southwestern part. The swamps were largely stocked with timber, generally Tamarack with Cedar, and only part of them were bare grass marshes or moss bogs. The mixed forest was made up of few species; the scattered White Pine towered high above the surrounding trees, Hemlock occurred mostly as old timber scattered or in denser clusters, and the hardwoods themselves were composed almost entirely of Basswood, Birch, Elm, Maple, Ash and Oak. At present the Pine has been cut from nearly 90 per cent of the area, numerous tracts of pinery are bare; the hardwoods have been cut into along several of the railway lines, especially in the Oak districts; Hemlock has been sparingly utilized as yet, but the hardwoods, Hemlock and even the swamp timbers have suffered in places severely from the fires following Pine slashings.

Though the great body of the land is wooded, and in places well timbered, the cut-over lands without any merchantable timber occupy about 45 per cent of the total area, the largest tract occurring in the areas where Pine predominated.

Originally this area contained, by a reasonable calculation, about 130 billion feet B. M. of Pine (fully 95 per cent White Pine), about 20 billion feet Hemlock and about 30 billion feet hardwoods; at present the estimate is for Pine, 17 billion feet B. M.; Hemlock, 12 billion feet B. M.; hardwoods, 16 billion feet B. M. Of the 130 billion feet B. M. Pine, there were cut about 66 billion in 1873–97; about 20 billion prior to 1873; standing, 17 billion; total, 103 billion, leaving about 30 billion to be accounted for as wasted and destroyed, chiefly by fire. The cut in Pine for over ten years has averaged near 3 billion feet, and was over 2 billion in 1897. How long this Pine will last it is impossible to say, since a continued reduction of output will postpone the end. As matters stand the supply is rapidly diminishing.

The young timber is cut, or else injured by fire, and the bare cut-over lands remain bare, and their fertility is still further reduced by repeated fires and exposure to wind and sun. The State of Wisconsin in this manner loses the growth from about 8 million acres of land, while its second greatest industry is gradually crowded out of existence. Assuming 100 feet B. M. per acre and year as a normal growth for this region —it might readily be twice that amount— the annual loss of production is at least 800 million feet B. M., the loss from the removal of the wood industries, which must be the consequence of exhaustion of supplies, may be inferred from the fact that the capital invested in the lumber industry alone in 1890 was over 80 million dollars, that this industry paid that year over 15 million dollars in wages, and that the timber products at first hand were worth 50 million dollars, or about one-third the value of all farm products That such a loss will be difficult to balance in a State like Wisconsin, which itself consumes over 600 million feet of lumber, besides more than 10 million dollars' worth of other forest products, is evident, and the movement for rational and energetic action on the part of its people, therefore, most timely.

Trees from South Asia Acclimated in Southern California.—II.

The well-known Mango, *Mangifera indica*, represents Indian Anacardiaceæ with us; it has been ripening perfect fruits at Santa Barbara, so that it can be reasonably expected to prove an addition to the number of exotic fruits to be raised profitably on this coast. The best varieties should be selected.

As is to be expected, the vast order of the Leguminosæ adds many plants to our gardens from southern Asia. Among these are *Dalbergia purpurea* and *D. sissoo*, both from India, the last yielding one of the most prized timbers, and possessing the remarkable quality of thriving as well on the driest as on flooded places; several Bauhinias, namely, *B. acuminata*, *B. diphylla*, *B. purpurea*, *B. tomentosa*, *B. variegata*, all recommendable for their elegant bilobed foliage and showy flowers of different colors, looking like giant butterflies; the gorgeous-flowered *Saraca indica;* quite a number of Acacias, *A. arabica*, *A. catechu*, *A. leucophlæa* and *A. suma*, all of them yielding more or less valuable gum; *Albizzia lebbek*, *A. odoratissima*, *A. procera*, *A. stipulata*, very fast-growing trees and feathery and ornamental; the rare *Lysidice rhodostegia*, from Hong-Kong.

Rosaceæ have lately contributed *Prunus puddum*, from high elevations on the Himalayas, which blooms in November and ripens fruits very early in spring, and is likely to prove very useful to breed a new strain of extra early cherries.

Of the tropical order Combretaceæ we have only one representative for the present in *Terminalia tomentosa*, growing very freely and promising to make a fine shade tree. It is interesting also for the tanning properties of its bark and the mucilage contained in its leaves. The more commonly known *T. catappa* has been tried also, perhaps under unfavorable conditions, and has not proved a success. *Eugenia jambos*, the rose apple, and *E. jambolana* well typify the Indian Myrtaceæ, of which order we have so many representatives from Australia. These two species bloom and fruit quite freely at Santa Barbara and in other places.

Among Lythrarieæ, *Lagerstræmia indica*, in different varieties, has been introduced long ago and proves quite hardy all over California, being one of the most desirable among deciduous flowering trees. Recently the more tender *Lagerstræmia flos-reginæ* has proved hardy at Santa Barbara This is a truly magnificent tree, both for its foliage and for its flowers. In India its timber is considered next to teak in value.

Cornus capitata, from the Himalaya, known also as *Benthamia fragifera*, represents the Cornaceæ or dogwoods, of which we have a larger one growing on this coast, *Cornus nuttallii*.

Of Indian Sapotaceæ we have only *Mimusops elengi*, growing very freely, a very handsome evergreen tree, bearing white star-like flowers, deliciously scented and edible fruits, almost every part of this tree having medicinal properties.

Plumieria acuminata and *Rauwolfia chinensis* represent the order of Apocynaceæ and grow into good-sized trees.

Bignoniaceæ, which have given us already so many showy climbers from different parts of the world, and the tree Jacaranda, from Brazil, are bringing in some trees from India and southern China, which appear quite promising and desirable for their foliage as well as their flowers, namely, *Oroxylon indicum*, interesting also for its medicinal properties; *Stereospermum suaveolens* and *S. sinicum*.

Of Verbenaceæ we had only shrubs and herbs from various countries; now southern Asia has contributed three species of Gmelina, *G. asiatica*, *G. arborea* and *G. rheedii*, all three handsome trees with beautiful flowers and valuable timber. The nearly related *Tectona grandis*, the source of the famous teak wood, up to the present time has proved difficult to raise, seeds generally failing to germinate, or soon

damping off after germinating. With proper care we hope to succeed, however, in growing this

To Laurineæ we are indebted for *Cinnamomum zeylanicum*, the true Cinnamon, from Ceylon, besides *C. camphora* and *C. pedunculatum*, coming from Formosa, China and Japan.

Euphorbiaceæ, from southern Asia, are well represented with us. We have already the curious-looking *Euphorbia tirucalli; Fluggea leucopyrus*, bearing sweet white berries; *Antidesma bunius*, with red berries in clusters; *Jatropha curcas*, the Purging-nut; *Aleurites moluccana*, the Candle-nut tree, which produces the so-called kekune oil, the last three trees having already bloomed here, and, in addition, *Croton tiglium*, which yields croton oil, and *Excœcaria agallocha*, from Cochin China.

As mentioned before in these columns, we have several species of Ficus from India (Moreæ) which are growing remarkably well, and most of them bearing figs, even in the young stage. Such are *Ficus bengalensis* the true Banyan; *F elastica*, the true rubber tree; *F. glomerata*, the cluster fig; *F. oppositifolia*, *F. retusa*, *F. religiosa*, the sacred *peepul; F. infectoria* and *F. indica*. We have also *Celtis sinensis*, which makes an excellent street tree, distinguishable from its congeners by its brick-red berries.

Cupuliferæ are represented up to the present time by one species only, *Quercus incana*, notable for its narrow leaves, silver-white underneath.

There are many conifers from the Himalaya and from south China that are taking well to the climate of southern California, and large specimens of some of them are to be seen in this neighborhood. From China we have *Cupressus funebris*, *Cunninghamia sinensis* and *Pinus sinensis*, the last one introduced quite recently; from the Himalaya, *Cedrus deodara*, *Cupressus torulosa*, *Pinus excelsa*, *P. gerardiana*, *P. longifolia*.

Almost all obtainable species of Palms have been introduced to southern California. Those from southern Asia that can be said to have made their proofs already are the following: *Phœnix farinifera*, *P. sylvestris*, *P. rupicola*, *P. zeylanica*, *P. humilis*, *P. hanceana*, *P. pumila*, *Livistona chinensis*.

This enumeration of trees acquired to this country I will bring to a close, including in it the tall-growing Bambusaceæ, from southern Asia, already introduced and thriving well with us, namely, *Bambusa arundinacea*, *B. orientalis* and *B. vulgaris*, *Dendrocalamus strictus* and *D membranaceus*. These are sure to prove not the least interesting nor the least useful among the contributions for which southern California is indebted already to southern Asia.

F. Franceschi.

Santa Barbara, Cal.

A New Pest of the Monterey Pine.

During the fall of 1896 it was noticed that occasional trees of the Monterey Pine (*Pinus insignis*), growing in the arboretum of the Leland Stanford, Jr., University, were badly attacked by some enemy whose real nature was not made out until during the past winter.

The injury consists in the abortion of the young leaves, occurring first on the tops of the branches and extending from the younger leaves to the older, until finally all the leaves on a tree are reduced in length to one or one and a half inches, only about one-fourth of their normal length. As a result the more damaged of our Monterey Pines resemble somewhat the trees of the Squirrel-tail Pine (*Pinus balfouriana*).

This injury is caused by the larvæ of a fly, perhaps allied to the genus *Diplosis*. The young larvæ agree very well with the description given by Packard in the Report of the Entomological Commission, for the larvæ of *Diplosis pini-rigida*. The injury to the Pine is very similar to that figured by the author in the same connection.

The Monterey Pine, although naturally confined to a very restricted territorial region near Monterey, has been extensively planted as an ornamental

tree over the entire State. Although this is the first season in which the ravages of the pest have been plainly evident, some of the trees in the University arboretum are nearly or quite dead. It is evident that unless some counteracting enemy appears and exterminates this new pest, many of our best groves of this Pine will be irretrievably damaged.

So far the damage is apparently confined to the older Pines in the Santa Clara Valley. It has not yet been reported from the native groves of this species at Monterey, but it is said that a similar damage has been done to the Austrian Pines in the Golden Gate Park. In the University arboretum the damage is confined exclusively to the Monterey Pine, although other species grow in close proximity. In connection with this pest two important questions arise: 1. To what an extent will our Pines be damaged, and what can be done to prevent further destruction? 2. Does this pest in any way account for the very restricted native distribution of the Monterey Pine, when it apparently is so well suited to almost all conditions of soil and temperature?

FRANK H. LAMB.

Forestry School at Biltmore, N. C.

Dr. C. A. Schenck, Forester to the Biltmore Estate, sends the following prospectus of his projected forestry school, the course being open to graduates of American colleges and U. S. military academies:

Course begins September 1, 1898, and lasts twelve months.

PRACTICAL INSTRUCTION in the forest, where actual work (cutting, planting, road-making, etc.) is going on.

THEORETICAL INSTRUCTION, treating the entire subject of forestry: Silviculture; Forest Utilization; Forest Management; Forest Finance; Forest Protection; Forest Politics; Forest History; short sketch relative to fish and game keeping. *Practical forest researches.*

Board to be secured by the student to suit his own taste, either at one of the numerous hotels or boarding houses at Asheville ($8 to $15 per week), or at the house of a general foreman of the Biltmore Estate ($5 per week).

Terms of admission: $200 for the entire course of instruction.

Applications to be addressed to C. A. Schenck, Biltmore, N. C.

Book Notices.

The United States Division of Forestry has just issued an important number of its Timber Physics Series in "Circular 18." In this circular announcement is made of the most valuable result yet attained in this line of work, namely, that the *strength of beams at elastic limit is equal to the strength of the material in compression*, and that the strength of beams at rupture can be directly calculated from the compression strength, so that in future only compression tests will be necessary. A discussion of this discovery by its author, Mr. S. T. Neely, with a review of the data on which it is founded, give to this circular unusual interest and value.

1. The results of other series of experiments show further that wood is so variable a material that a difference in test results or strength of 10 per cent in coniferous woods and 20 per cent in hard woods is not a difference which warrants a distinction in quality.

2. Wood testing should be done preferably on green or soaked timber, thus eliminating the variable influence of moisture on strength, which begins to assert itself when the moisture is below 32 per cent.

3. A well-planned series on small laboratory sizes furnishes more reliable standard and average values for practical use than tests on large beams and columns. This conclusion is the result of some 60 tests on large beams and over 100 tests on large columns, compared with over 1,000 tests on small pieces cut from them.

4. The best size for compression pieces to furnish the most uniform results is a cube of 2 or 3 inches.

5. Wood compressed across the grain increases in strength comparatively, and does not lose its strength in endwise compression, pieces compressed to 50 per cent of their original height exhibiting as much compression endwise strength as uninjured ones.

"*Nature Study*" is the latest fad, which seems to take the country by storm and threatens to increase the "ideals" studied in our schools at the cost necessarily of the "commonplace." We would not wish to disparage the study of nature *incidentally* in the schools and out of them, with a good deal of attention to forests, forest trees and forestry, but we would warn our educators against expecting too much and attempting too much. While there is always opportunity to illustrate lessons, even in mathematics, by references to nature, we know that there are already too many heterogeneous subjects crowded into the courses of the common schools, entailing for the sake of a diffusive half knowledge deficiencies and lack of thoroughness in the essentials.

We have before us a series of ten "*Leaflets on Nature Study*," *especially adapted to the use of children in schools in rural districts, prepared by the Faculty of Purdue University, Indiana*, which are intended to assist teachers in bringing "the children" into close sympathy with nature, to cultivate the habit of accurate observation, etc. We have never seen anything better of their kind, and if the teacher will study them until he has mastered their spirit, he will have at command a valuable and interesting way of waking the children up after an hour of tedious work on less interesting things.

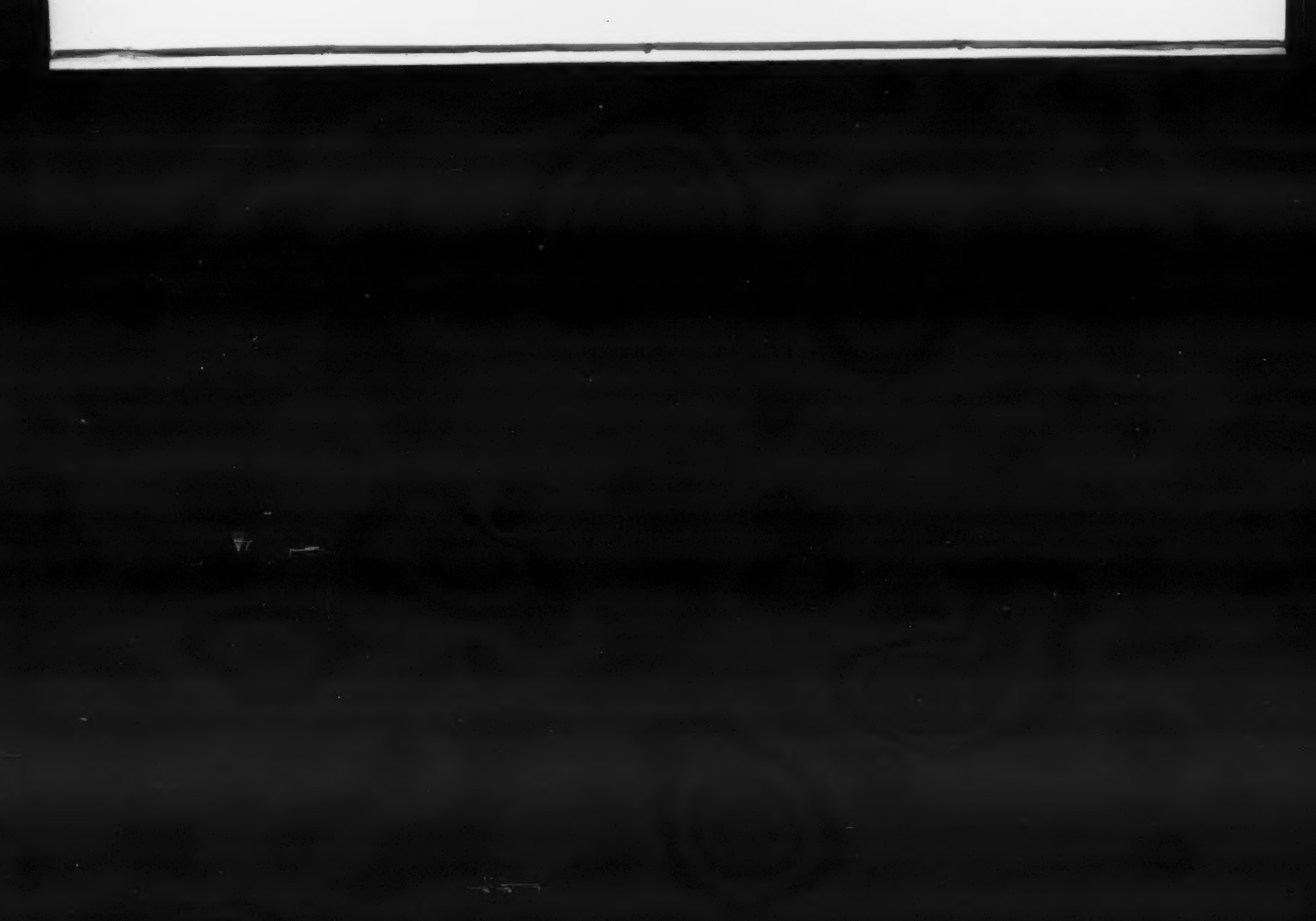
Leaves, trees, birds, insects, and farm animals—the familiar and everyday surroundings of the country boy and girl, are the subjects treated, and all are treated well. But the teacher should never lose sight of the secondary importance of such exercises; "the three R's" are still the bulwark of public school education.

Nature and Art, a monthly magazine, now in the fifth number of its first volume, is another help to "Nature Study" in the schools, and one calculated to furnish the teacher with a great variety of material. The first number contained the table of contents for the entire year, each number being devoted to a single subject. The second number was devoted to Forests and Lakes and Rivers. Under-Ground and The Air have since been treated. Each number contains several colored plates.

It is not the large cities of the country alone that have provided a park system for their people. *The Report of the Park Commissioners of the town of Plymouth, Mass.*, for 1897 shows that Littleburough, of 7,000 inhabitants, is to have five parks, one of which contains about 500 acres of land and water, including the most beautiful natural scenery of the township. But even with such appreciation as is evinced by the size and number of their parks, the dwellers by Plymouth Harbor have evidently not learned to value their trees, as the Commissioners make record of serious injury to fine specimen trees by persons who cut back the branches for decorative use.

Two important contributions on forestry topics from Canada have recently reached THE FORESTER. One of these is "*The Geographical Distribution of Forest Trees in Canada*," by Dr Robert Bell. It includes a map showing the northern limits of 30 of the most important species of the great forest region of Canada. There are 123 indigenous tree species, of which 29 are confined to the Pacific Slope. Of those unrepresented in the pamphlet the greater number are confined to small areas in southern Ontario.

To be sure this is a pioneer work, and errors, of which we have discovered some, are likely to occur in such an attempt. Before we shall be able to delimit our species with more precision, especially in these northern, less known latitudes, much more work in plant-geography will have to be done.



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